2003P88063US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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| In re Application of | ) **BEFORE THE BOARD OF PATENT** |
| | ) **APPEALS AND INTERFERENCES** |
| Charles W. ALVORD et al. | ) |
| | ) Appeal No.: |
| Serial No. 10/671,086 | ) |
| | ) Examiner: Daniel L. Greene |
| Filed: September 25, 2003 | ) |
| | ) Group Art Unit: 3694 |
| For: TANTALUM WATER TARGET BODY FOR PRODUCTION OF RADIOISOTOPES | ) |
| | ) May 30, 2007 |
| | ) |

## BRIEF ON APPEAL

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This is an appeal from the final rejection of claims 37-49 of the above-identified application, which claims were finally rejected in the Office action dated January 4, 2007. A Notice of Appeal was timely filed on March 30, 2007. Pursuant to the Notice of Panel Decision from Pre-Appeal Brief Review dated April 18, 2007, the time period for filing this Brief continues to run from March 30, 2007.

## REAL PARTY IN INTEREST

The real party in interest in this case is Siemens Medical Solutions USA, Inc. of Malvern, Pennsylvania.

## RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences, which would have any direct or indirect affect on the Board's decision in the present appeal.

## STATUS OF THE CLAIMS

Claims 37-49 are pending in the application and stand finally rejected. Claims 1-36 were cancelled. Claims 37 and 44 constitute the independent claims on appeal. This appeal is directed to claims 37-49.

## STATUS OF AMENDMENTS

No proposed amendment after final has been filed in this application.

## SUMMARY OF THE CLAIMED SUBJECT MATTER

The present invention relates generally to the field of radioisotope production and in particular to a target assembly for containing and cooling enriched water (e.g., water enriched with $^{18}O$) that is used to produce fluorine-18 ($^{18}F$) by being bombarded with a beam of nuclear particles, such as protons, from a particle accelerator. Fluorine-18 is used to produce $^{18}F$-FDG (fluorodeoxyglucose), a glucose analog commonly used in Positron Emission Tomography (PET).

One significant factor in production of the radioisotope is control of the temperature of the target water, as particle beam bombardment quickly raises the

temperature of the water. Heat must be efficiently removed from the target water to maximize its effective density. Heat removal has been a significant problem in the art, which limits the magnitude of the bombarding beam current and hence the production rate of the radioisotope. Higher production rates are achieved only if particle beams with higher current magnitudes can be used. The present invention provides a novel target assembly with a cooling channel configuration that permits the target assembly to operate at higher beam currents and therefore achieve higher production rates.

In accordance with the claimed invention as set forth in claim 37, a target assembly as shown in Fig. 5 has a target body 10, a target chamber 104' formed within

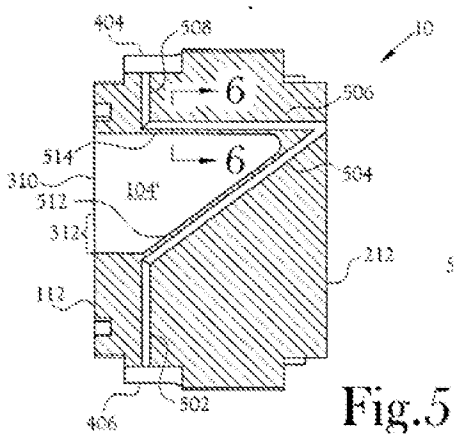


Fig.5

the target body having a front window 310, a rear wall 512 opposite the front window, the rear wall being sloped with respect to the front window, and a top wall 514 connecting the rear wall to the front window. The assembly further contains a first cooling channel 508 having a first fluid inlet 404 at one end of the target body, a first fluid outlet 406 at another end of the target body, and a first cooling fluid channel conduit (502, 504, 506) formed within the target body coupling the first fluid inlet with the

first fluid outlet, and running along at least a portion of the rear wall and along a portion of the top wall.

Operation of the target assembly as set forth in claim 37 is described in the specification at paragraphs [0027] – [0031].

In accordance with the claimed invention as set forth in claim 44, a target assembly as shown in Fig. 5 has a target body 10, a target chamber 104' formed within the target body having a front window 310, a rear wall 512 opposite the front window, the rear wall being sloped with respect to the front window, and a top wall 514 connecting the rear wall to the front window. The assembly further contains a first cooling channel 508 having a first fluid inlet 404 at one end of the target body, a first fluid outlet 406 at another end of the target body, and a first cooling fluid channel conduit (502, 504, 506) formed within the target body coupling the first fluid inlet with the first fluid outlet, and running along at least a portion of the rear wall and along a portion of the top wall. The assembly further contains a second cooling channel having a second fluid inlet at one end of the target body, a second fluid outlet at another end of the target body, and a second cooling fluid channel conduit formed within the target body coupling the second fluid inlet with the second fluid outlet, and running substantially parallel to the first cooling fluid channel conduit.

The embodiment as set forth in claim 44 is shown in Figs. 4 and 5, wherein the cross-sectional view of Fig. 5 shows one of two similar cooling channels, as indicated at

404 in Fig. 4. The operation of the embodiment of claim 44 is similar to the description of the operation of the assembly as set forth in claim 37 above.

## GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

This appeal presents the following issues for review by the Board:

1) Whether claims 37, 38, 40-44 and 46-49 are unpatentable under 35 U.S.C. § 102(a) as being anticipated by the admitted prior art disclosed as Figs. 1-3 of the present application ("APA"), and are properly rejected on that basis;

2) Whether claims 37-49 are unpatentable under 35 U.S.C. § 102(b) as being anticipated by Satyamurthy et al. (described in the present application at paragraph [0018] and cited in an Information Disclosure Statement filed with the application), and are properly rejected on that basis;

3) Whether claims 37-49 are unpatentable under 35 U.S.C. § 103(a) as being obvious over the APA in view of Alvord (USP 6,359,952), Fujiwara et al. (USP 6,483,118), Schlyer et al. (USP 5,917,874), or Amini, and further in view of Satyamurthy et al., and are properly rejected on that basis; and

4) Whether claims 37-49 are unpatentable under 35 U.S.C. § 103(a) as being obvious over Satyamurthy et al.

## ARGUMENT

**The Rejection of Claims 37, 38, 40-44 and 46-49 Is Improper**

The APA refers to Figs. 1-3 of the application, which disclose a prior art target assembly. As shown, the prior art target assembly contains cooling channels 302, 304 on the outside circumferential surface of the target assembly 110. Additional channels 202, 204 are located along rear surface 212 of the assembly. Cooling water flows into a transverse cut in the bottom of the assembly, through channels 302, 304 along the circumference of the assembly, and collects in transverse cut 102 as in Fig. 2. The structure of the APA is described at paragraphs [0008] – [0011] of the specification.

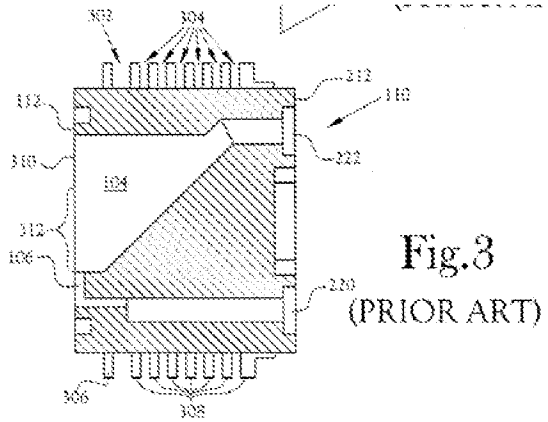


Fig.3
(PRIOR ART)

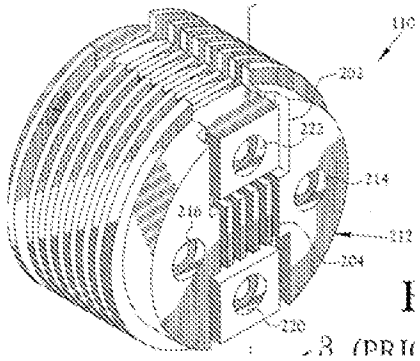


FIG. 2 (PRIOR ART)

The APA fails to disclose a first cooling channel having a first cooling fluid inlet at one end of the target body. There is no fluid inlet coupled to a cooling channel in the prior art assembly. Instead, cooling water flows into the transverse cut or "channel" at one end of circumferential channels 302, 304, through the channels 302, 304, and collects in second transverse cut or "channel" 102. See the specification at paragraph 0009.

APA further fails to disclose a first cooling fluid channel conduit formed within the target body coupling the first cooling fluid inlet with the first cooling fluid outlet, and running along at least a portion of the sloped rear wall and along a portion of the top wall. Channels 302, 304 are not formed within the target body, as apparent from Fig. 3 above.

The Examiner's interpretation of the target body as extending to the "outer peripheries" 306, 308 of the external cooling channels 302, 304, is outside the broadest reasonable interpretation standard that must be used when examining claims for patentability, as it is contrary to and thus inconsistent with the specification. As disclosed and explained, the channels 302, 304 are formed on the outside surface of the target assembly 110, and are exposed to the external environment.

The claim language must be interpreted in light of the specification to be consistent with the specification. Inasmuch as the specification defines the disclosure of the APA structure and distinguishes that structure from the inventive structure, the

arbitrary interpretation of the claim language to "read" on the prior art structure from which it is distinguished is intrinsically improper.

APA further fails to disclose that the cooling channel conduit runs along at least a portion of the sloped rear wall as claimed. As is apparent, the channels 302, 304 run along the outer circumference of the target assembly and do not run along the rear wall, as does channel conduit 504 as disclosed in Fig. 5. APA further fails to disclose the cooling channel conduit running along a portion of the top wall connecting the front window and rear wall, as does conduit portion 506 as shown in Fig. 5. If anything, channels 302, 304 run transverse to the top wall in the prior art assembly, and do not run along the top wall at any portion.

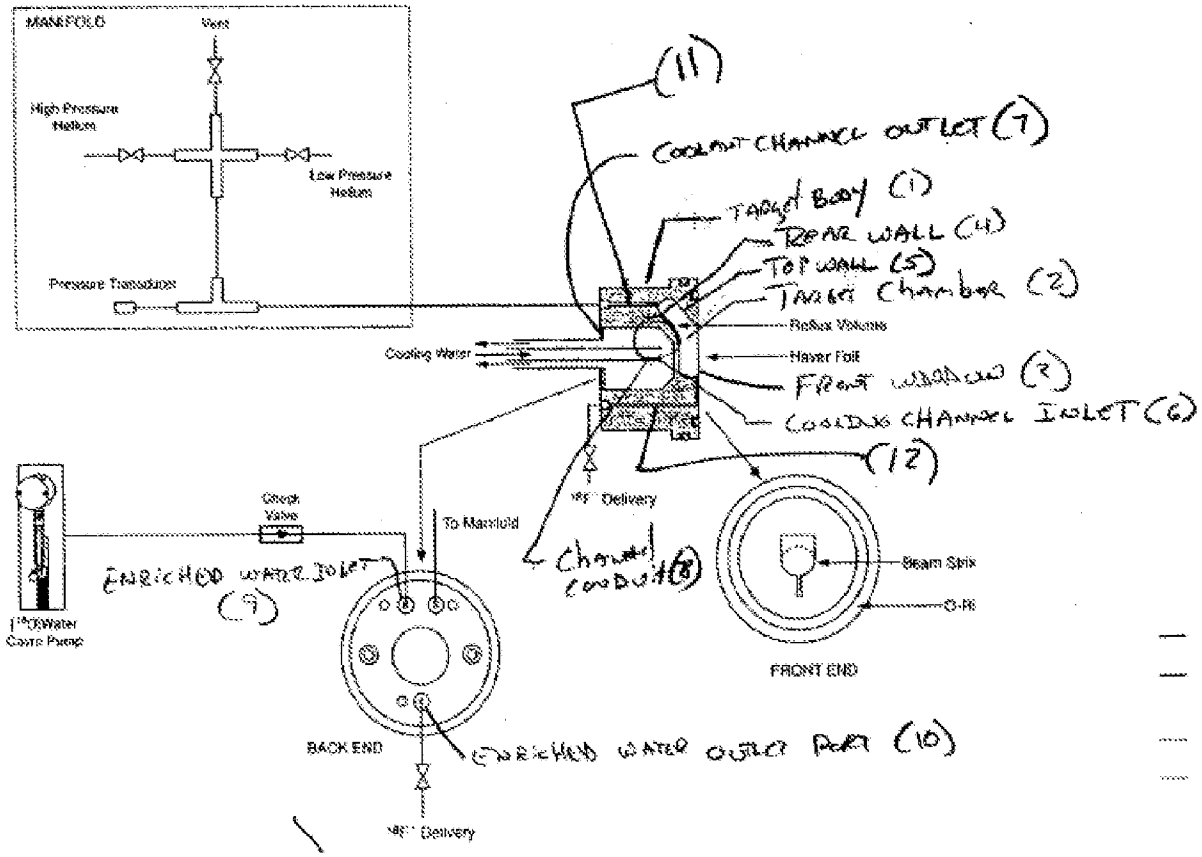
Because the APA fails to disclose any of the limitations as set forth above, the rejection of claims 37, 38, 40-44 and 46-49 as being anticipated by the APA is improper as a matter of law and should be reversed.

**The Rejections of Claims 37-49 As Being Anticipated or Obvious Over Satyamurthy Are Improper**

Satyamurthy discloses in Fig. 1 a cooling water chamber directly behind a target chamber, with a cooling water inlet tube entering one side of the cooling water chamber and being surrounded by a concentric cooling water outlet tube. There are no cooling fluid channel conduits formed within a target body or running along top and rear walls of a target chamber as required by the pending claims of this application. Instead, there is

one large cooling water chamber formed adjacent to the target chamber. There are no cooling fluid inlets or outlets at respective ends of the target body. Instead the inlet and outlet are concentrically located and formed at one end of the cooling water chamber, not the target body.

The Examiner's annotated mark-up of Satyamurthy is reproduced below.




The Examiner alleges that "channel conduit" 8 as indicated corresponds to the claimed first channel conduit running along at least a portion of said rear wall and along a portion of said top wall. As clearly shown, however, the cooling water inlet tube marked as reference numeral 8 by the Examiner is concentrically located within a cooling water

outlet tube. The cooling water inlet tube does not run along any portion of a rear wall being sloped with respect to a front window. It further does not run along any portion of a top wall as claimed. It further does not couple a first cooling fluid inlet at one end of the target body with a first cooling fluid outlet at another end of the target body as required by the claims. As shown, the "inlet" and "outlet" are concentrically co-located at the same position.

With respect to claim 44, the Examiner alleges that it would have been obvious "to include any number of cooling channels in Satyamurthy in order to optimize the cooling of the target body." However, the final rejection provides no evidence to support this allegation. Instead, the allegation of obviousness is wholly conclusory and as such cannot stand.

**The Rejection of Claims 37-49 As Obvious over APA Is Improper**

The final rejection alleges that if APA is not considered to disclose cooling fluid channel conduits formed in the target body (which indeed is the fact), then any of the Alvord, Fujiwara, Schlyer, Amini and Satyamurthy references are relied upon to show that "it is clearly known to those of ordinary skill in the art to utilize internal cooling channels to cool whatever portion of the target body needs cooling to ensure that it doesn't overheat, warp, etc."

This statement however does not establish that it would have been obvious to one of ordinary skill in the art to have modified the APA to arrive at the claimed

invention from the teachings of the various secondary references. First, there is no evidence that the APA is subject to overheating or warping. To the contrary, the APA has been successfully used in the past to produce radioisotopes. The problem with the APA that is solved by the present invention has nothing to do with warping or overheating, but instead relates to significantly improving upon limited production rates. The final rejection provides absolutely no evidence that any of the secondary references taught those skilled in the art to modify a target assembly for the production of radioisotopes to incorporate the claimed cooling channel structure to solve a problem that is not recognized.

**CONCLUSION**

In view of the foregoing, claims 37-49 are submitted to be directed to a new and unobvious target assembly for containing and cooling enriched water for the production of fluorine-18, which is not taught by the prior art. The rejections of the claims are based on improper and arbitrary interpretations of the claim limitations, and are not based on the broadest reasonable interpretation consistent with the specification, as required under the established legal precedent.

The Honorable Board is respectfully requested to reverse all grounds of rejection and to direct the passage of this application to issue.

Please charge any fee or credit any overpayment pursuant to 37 CFR 1.16 or 1.17 to Novak Druce Deposit Account No. 14-1437.

Respectfully submitted,

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## CLAIMS APPENDIX

37. A target assembly for containing and cooling enriched water for the production of fluorine-18, comprising:

a target body;

a target chamber formed within said target body, said target chamber having a front window for exposing said chamber to a particle accelerator, a rear wall opposite said front window, said rear wall being sloped with respect to said front window, and a top wall connecting said rear wall to said front window; and

a first cooling channel having a first cooling fluid inlet at one end of said target body, a first cooling fluid outlet at another end of said target body, and a first cooling fluid channel conduit formed within said target body coupling said first cooling fluid inlet with said first cooling fluid outlet, said first cooling fluid channel conduit running along at least a portion of said rear wall and along a portion of said top wall.

38. A target assembly as set forth in claim 37, further comprising:

a second cooling channel having a second cooling fluid inlet at one end of said target body, a second cooling fluid outlet at another end of said target body, and a second cooling fluid channel conduit formed in said target body coupling said second cooling fluid inlet with said second cooling fluid outlet, said second cooling fluid channel conduit running substantially parallel to said first cooling fluid channel conduit.

39. A target assembly as set forth in claim 37, wherein said target body is fabricated substantially from tantalum.

40. A target assembly as set forth in claim 37, further comprising an enriched water inlet port formed in said target body, an enriched water inlet channel coupled between said target chamber and said enriched water inlet port, an enriched water outlet port

formed in said target body, and an enriched water outlet channel coupled between said target chamber and said enriched water outlet port.

41. A target assembly as set forth in claim 40, wherein said enriched water inlet port is located at an outer surface of said target body, said outer surface being substantially parallel to said front window.

42. A target assembly as set forth in claim 40, wherein said enriched water outlet port is located at an outer surface of said target body, said outer surface being substantially parallel to said front window.

43. A target assembly as set forth in claim 40, wherein said enriched water inlet port is located at an outer surface of said target body, said outer surface being substantially parallel to said front window, and said enriched water outlet port also is located at said outer surface of said target body.

44. A target assembly for containing and cooling enriched water for the production of fluorine-18, comprising:

a target body;

a target chamber formed within said target body, said target chamber having a front window for exposing said chamber to a particle accelerator, a rear wall opposite said front window, said rear wall being sloped with respect to said front window, and a top wall connecting said rear wall to said front window;

a first cooling channel having a first cooling fluid inlet at one end of said target body, a first cooling fluid outlet at another end of said target body, and a first cooling fluid channel conduit formed within said target body coupling said first cooling fluid inlet with said first cooling fluid outlet, said first cooling fluid channel conduit running along at least a portion of said rear wall and along a portion of said top wall; and

a second cooling channel having a second cooling fluid inlet at one end of said target body, a second cooling fluid outlet at another end of said target body, and a second cooling fluid channel conduit formed within said target body coupling said second cooling fluid inlet with said second cooling fluid outlet, said second cooling fluid channel conduit running substantially parallel to said first cooling fluid channel conduit.

45. A target assembly as set forth in claim 44, wherein said target body is fabricated substantially from tantalum.

46. A target assembly as set forth in claim 44, further comprising an enriched water inlet port formed in said target body, an enriched water inlet channel coupled between said target chamber and said enriched water inlet port, an enriched water outlet port formed in said target body, and an enriched water outlet channel coupled between said target chamber and said enriched water outlet port.

47. A target assembly as set forth in claim 46, wherein said enriched water inlet port is located at an outer surface of said target body, said outer surface being substantially parallel to said front window.

48. A target assembly as set forth in claim 46, wherein said enriched water outlet port is located at an outer surface of said target body, said outer surface being substantially parallel to said front window.

49. A target assembly as set forth in claim 46, wherein said enriched water inlet port is located at an outer surface of said target body, said outer surface being substantially parallel to said front window, and said enriched water outlet port also is located at said outer surface of said target body.

**EVIDENCE APPENDIX**

None

## RELATED PROCEEDINGS APPENDIX

None